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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,530	09/01/2006	Kaoru Miyamoto	1680/15	2171
25297 7590 04/14/2010 JENKINS, WILSON, TAYLOR & HUNT, P. A. Suite 1200 UNIVERSITY TOWER 3100 TOWER BLVD., DURHAM, NC 27707			EXAMINER WILSON, MICHAEL C	
			ART UNIT 1632	PAPER NUMBER
			MAIL DATE 04/14/2010	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,530	Applicant(s) MIYAMOTO ET AL.	
	Examiner Michael C. Wilson	Art Unit 1632	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,8,11 and 12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12 is/are allowed.
- 6) ☒ Claim(s) 1,3-5,8 and 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3-29-10</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3-29-10 has been entered.

Applicant's arguments filed 3-29-10 have been fully considered but they are not persuasive.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 2, 6, 7, 9 and 10 have been canceled. Claim 12 has been added. Claims 1, 3-5, 8, 11 and 12 are pending and under consideration.

Applicants are reminded to provide support for amendments by page and line number at the beginning of each response. The paragraph on pg 5 of the response filed 3-29-10 discussing support for the amendments should be in the first paragraph of the response. Applicants are reminded that an examiner's office action cannot be relied upon for support for a claim amendment.

Claim Rejections - 35 USC § 112

Claims 1, 3-5, 8 and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject

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matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The genus of making cells that produce "steroid hormone-producing enzymes" in claim 1 is new matter. Support has not been provided and cannot be found in the specification as originally filed. In particular, the specification is drawn to making steroid hormone producing cells, not steroid hormone enzyme-producing cells. The scope of the invention is limited to differentiate MSC into "steroid-producing cells" (pg 1, lines 4-5). It is not readily apparent that applicants contemplated the scope of making cells that produce the "steroid hormone-producing enzymes" now claimed.

Enablement

Claims 1, 3-5, 8 and 11 remain rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for differentiating mesenchymal stem cells by transfecting the cells with a vector encoding steroidogenic factor 1 (sf-1) then stimulating the cells with cAMP such that the cells differentiate into cells that produce progesterone, androgen and androstendione, does not reasonably provide enablement for differentiating mesenchymal stem cells merely into cells that produce p450_{scc}, p450_{c17}, HSD3b1, StAR, 3 β -HSD, p450, c21, p450 11b1 and HSD3b6 without producing hormones. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

Claim 1 is drawn to differentiating mesenchymal stem cells (MSC) into cells that produce steroid hormone-producing enzymes by stimulating the cells, "in the presence of cAMP, by transfecting the cells with a vector encoding a steroidogenic factor 1 (SF-1), wherein the steroid producing enzymes are selected from the group consisting of p450scc, p450c17, HSD3b1, StAR, 3 β -HSD, p450, c21, p450 11b1 and HSD3b6." The claim are now limited to transfecting MSC with DNA encoding sf-1 in the presence of cAMP to induce differentiation. The claim encompasses differentiating MSC into any cells that produce steroid hormone-producing enzymes p450scc, p450c17, HSD3b1, StAR, 3 β -HSD, p450, c21, p450 11b1 or HSD3b6. The claims encompass producing cells that produce the enzymes claimed without producing hormones.

Val (Nuclear Receptor, 2003, Vol. 1, No. 8, pg 1-23) taught SF-1 acts on numerous genes, some of which are involved in hormone production (pg 7, "Genes implicated in steroidogenesis"). The effects of SF-1 on specific genes remain unclear (pg 9, col. 2 "SF-1 target genes: unanswered questions").

Crawford (Mol. Cell. Biol., July 1997, Vol. 17, No. 7, pg 3997-4006) taught differentiating embryonic stem (ES) cells by transfecting the cells with a vector encoding steroidogenic factor 1 (sf-1) then stimulating the cells with cAMP such that the cells differentiate into cells that produce progesterone (pg 3998, col. 1, ES cell culture; pg 4000, col. 1, "ES cells differentiate...").

Example 1 (pg 6) shows the MSC transfected with a vector encoding SF-1 express p450scc but fail to show the cells produce pregnenolone or any other hormone claimed.

Example 2 (pg 7) shows MSC transfected with a vector encoding SF-1 cultured in the presence of cAMP express p450scc, HSD3b1, p450c17 and produce progesterone, androgen and androstenedione. Example 2 shows the cells express p450scc but fail to show the cells produce progestin, estrogen, glucocorticoid or mineralcorticoid as claimed.

Example 3 (pg 8) shows MSC transfected with a vector encoding SF-1 cultured in the presence of cAMP express StaR, P450scc and 3 β -HSD, P450c21 and P45011b1. Example 3 fails to shows the cells produce any hormones as claimed.

Example 4 (pg 8) shows bone-marrow derived MSC (obtained from a Green rat apparently expressing GFP) transplanted into the testes of rats resulted in cells expressing GFP ("possibly derived from Green rat bone marrow" (pg 9, line 6) and P450scc. Example 4 fails to shows the cells expressing P450ssc WERE derived from the transplanted MSC or that the transplanted MSC produced hormones as claimed.

Example 5 (pg 9) shows differentiating MSC into cells that express p450scc, 3 β -HSD, HSD3b1 and HSD3b6; however, the cells do not produce the hormones claimed.

Claim 1 encompasses transfecting MSC with a vector encoding SF-1 and differentiating them in the presence of cAMP to produce cells that produce the enzymes listed in the claim. Claim 1 does not require the differentiated cells produce hormones. However, the sole disclosed purpose for the method claimed is to differentiate MSC into "steroid-producing cells" (pg 1, lines 4-5). The specification and the art at the time of filing do not teach how to use the method claimed to differentiate MSC transfected with a nucleic acid sequence encoding SF-1 (in the presence of cAMP) into cells that merely

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produce p450scc, p450c17, HSD3b1, StAR, 3 β -HSD, p450, c21, p450 11b1 and HSD3b6 without producing hormone. Given the state of the art taken with the limited teachings in the specification and the art at the time of filing, it would have required those of skill undue experimentation to determine how to use the method claimed to differentiate MSC into cell that merely produced the enzymes listed in claim 1 without producing hormones such as progestin, androgen and androstendione.

Response to arguments

Applicants' arguments are noted but do not address this new aspect of the claims as amended.

Indefiniteness

The rejections of claims 1-6, 8, 9 and 11 under 35 U.S.C. 112, second paragraph, have been withdrawn in view of the amendment.

Conclusion

Claim 1 has been allowed. The prior art of record did not reasonably teach or suggest a method of differentiating mesenchymal stem cells (MSC) into steroid hormone-producing cells comprising stimulating the cells, in the presence of cAMP, by transfecting the cells with a vector encoding a steroidogenic factor 1 (SF-1), wherein said hormone is selected from the group consisting of progesterone, androgen, and androstendione.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gondo (Genes to Cells, 2004, Vol. 9, pg 1239-1247)

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No claim is allowed.

Inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. Wilson who can normally be reached at the office on Monday through Friday from 9:30 am to 6:00 pm at 571-272-0738.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to (571) 272-0547.

Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now contact the USPTO's Patent Electronic Business Center (Patent EBC) for assistance. Representatives are available to answer your questions daily from 6 am to midnight (EST). The toll free number is (866) 217-9197. When calling please have your application serial or patent number, the type of document you are having an image problem with, the number of pages and the specific nature of the problem. The Patent Electronic Business Center will notify applicants of the resolution of the problem within 5-7 business days. Applicants can also check PAIR to confirm that the problem has been corrected. The USPTO's Patent Electronic Business Center is a complete service center supporting all patent business on the Internet. The USPTO's PAIR system provides Internet-based access to patent application status and history information. It also enables applicants to view the scanned images of their own application file folder(s) as well as general patent information available to the public.

For all other customer support, please call the USPTO Call Center (UCC) at 800-786-9199.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Peter Paras, can be reached on 571-272-4517.

The official fax number for this Group is (571) 273-8300.

Michael C. Wilson

/Michael C. Wilson/
Primary Patent Examiner